Existing Conditions

What information did we use for the existing conditions?

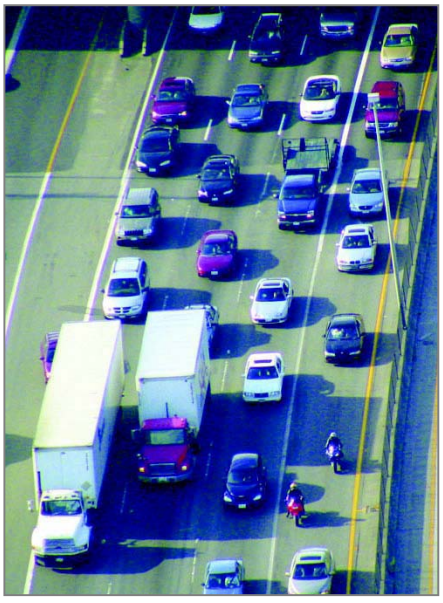
The I-405 Project used the year 2002 to represent existing conditions in the corridor. We assembled the existing I-405 freeway and ramp traffic volumes from the most recently available WSDOT data (2002). Traffic on the I-405 freeway uses two types of lanes: general-purpose (GP) lanes and high-occupancy vehicle (HOV) lanes. We collected local street traffic volumes from the City of Bellevue, traffic impact studies, and other transportation sources.

General Purpose (GP) Lanes

Roadway lanes available for use by all traffic.

High Occupancy Vehicle (HOV) Lanes

Roadway lanes available for buses, vanpools, and carpools with more than one occupant. Currently, two or more (2+) occupants are required by WSDOT to use the I-405 HOV Lanes.



Congestion building along the I-405 corridor

What are the average weekday traffic volumes in the study area?

The study area is one of the busiest sections of the I-405 corridor. I-405 between I-90 and SE 8th Street carries an average of 210,000 vehicles per weekday. This volume represents total northbound and southbound traffic.

What are the peak freeway volumes for the study area?

The peak period is the period of the day during which the maximum amount of travel occurs. We may specify the morning (A.M.), or the afternoon (P.M.) peak. The peak hour is the hour within the peak period when the maximum demand occurs. In

Congested I-405 in the Study Area, looking south

the study area, the morning peak hour is typically from 7:00 to 8:00 A.M., and the afternoon peak hour is typically from 4:30 to 5:30 P.M.

For the morning and afternoon peak hours, we calculated the number of vehicle trips and person trips traveling on I-405. Vehicle trips are the total number of vehicles that pass through a section of roadway within a specific time period. We calculated person trips by estimating the number of passengers in vanpools, carpools, and transit buses. For vehicle trips and person trips, we calculated the Mode Split. Mode is a particular form of travel. Typically, freeway modes include driving alone (single-occupancy vehicle [SOV]), carpooling (HOV), or riding transit. Mode split is the percentage of each mode type that vehicles or persons are using for travel.

In the A.M. peak period, northbound is the peak travel direction for I-405 in the study area. Northbound I-405 between I-90 and SE 8th Street carried 7,000 vehicles and 8,970 persons during the 2002 A.M. peak hour. Exhibit 7 shows the 2002 A.M. peak hour vehicle and person trips, mode split, and average travel speeds.

Exhibit 8 shows the existing 2002 P.M. peak hour vehicle and person trips, mode split, and average travel speeds. In the P.M. peak period, southbound is the peak travel direction for I-405 in the study area. Southbound I-405 between SE 8th Street and I-90 carried 6,130 vehicles and 8,060 persons in the 2002 P.M. peak hour. A southbound I-405 bottleneck at I-90 creates severe congestion and limits vehicle and person throughput. Although demand is higher southbound in the P.M. peak, the bottleneck causes the peak direction to have less throughput than the off-peak northbound direction.

What about off-peak directions?

During the A.M. peak period, southbound is the off-peak travel direction for I-405 in the study area. Southbound I-405 between SE 8th Street and I-90 carried 5,690 vehicles in the 2002 A.M. peak hour.

During the 2002 P.M. peak hour, northbound I-405 carried 6,700 vehicles between I-90 and SE 8th Street. Exhibits 7 and 8 show the existing traffic data for the A.M. peak hour and the P.M. peak hour respectively.

Exhibit 7. 2002 Existing A.M. Peak Hour Vehicle and Person Trips, Mode Split, and Average Travel Speed

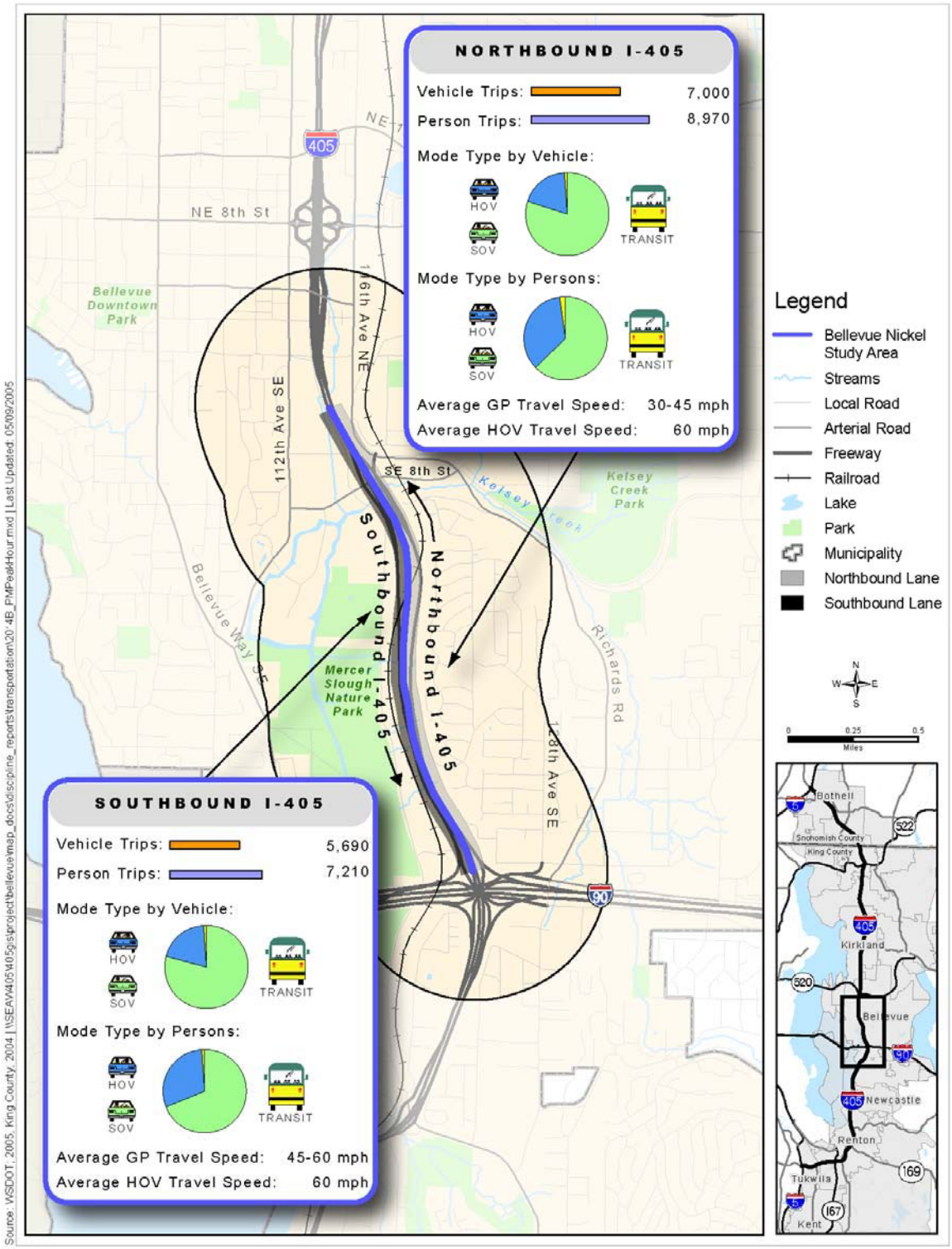
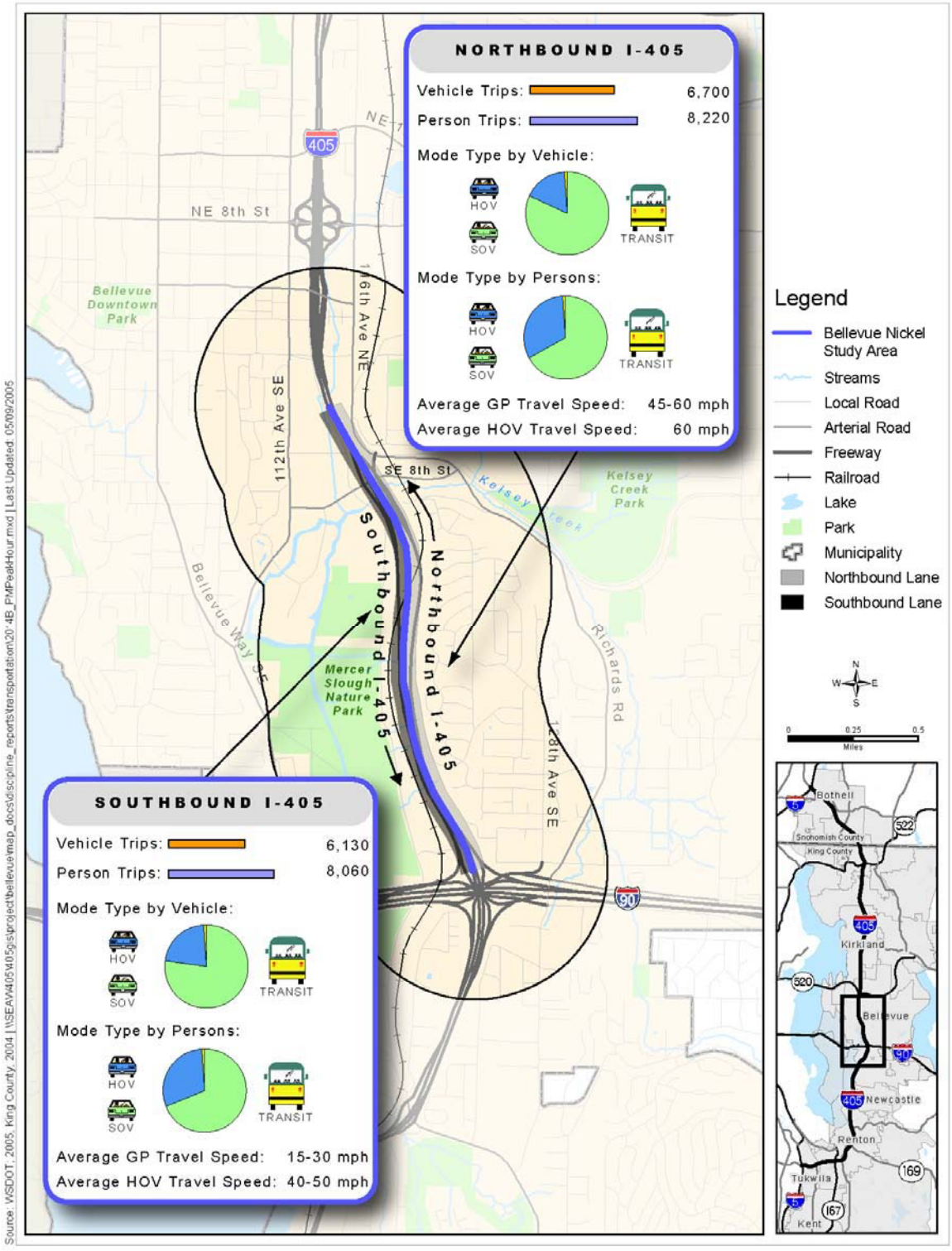


Exhibit 8. 2002 Existing P.M. Peak Hour Vehicle and Person Trips, Mode Split, and Average Travel Speed



How well does the freeway operate under existing conditions?

Engineers calculated the 2002 average travel speeds for the GP and HOV lanes with WSDOT speed detector loops, WSDOT Traffic Congestion Maps, and field observations. The travel speeds are a function of traffic volumes and driver comfort.

Speed Detector Loops

Wire loops imbedded in the freeway pavement to record the speed of vehicles traveling on the freeway.

HOV lanes generally flow freely during the A.M. and P.M. peak periods; they slow only when congestion in the adjacent and slower GP lanes causes HOV drivers to drive more cautiously.

We show average 2002 A.M. and P.M. peak hour travel speeds in Exhibits 7 and 8 respectively.

Peak Direction

In the 2002 A.M. peak hour, the northbound I-405 GP lanes average speeds of 30 to 45 miles per hour between I-90 and SE 8th Street.

Peak vs. Off-Peak Travel Directions

Peak travel direction is the direction of the freeway with higher demand and more congestion.

Off-Peak travel direction is the direction of the freeway with the lower demand.

In the 2002 P.M. peak hour, southbound I-405 clogs heavily, and the GP lanes average speeds between 15 and 30 miles per hour.

Off-Peak Direction

Both off-peak travel directions, (southbound in the A.M. and northbound in the P.M.), average GP speeds of 45 to 60 miles per hour in the study area.

Where are there safety concerns in the study area?

WSDOT collected historical accident information for 2001, 2002, and 2003, the most recent information available at the time of the analysis. The overall accident rate along I-405 was 1.48 accidents per million vehicle miles of travel. This is similar to other freeways in King County.

In the study area, the accident rate was 1.08, lower than the average for the whole corridor. During the three-year reporting period, there were approximately 150 accidents per year along the 1.9-mile area. The majority (49 percent) of accidents on mainline I-405 were rear-ending-type accidents, which is consistent with the high traffic volumes and traffic congestion in this area.

In addition to the accident rate analysis, WSDOT conducted a High Accident Location (HAL) Review in 2004. This review

identified the I-405 northbound off-ramp to SE 8th Street as a HAL, involving predominantly rear-end accidents.

Although not classified as a HAL, the I-405 northbound on-ramp from I-90 experienced a high incidence of rear-end and sideswipe accidents during the three-year reporting period. These collisions resulted from high volumes on the eastbound and westbound ramps from I-90 merging together and entering I-405 within a short distance.

What transit service is currently available in the study area?

King County Metro (Metro) and Sound Transit provide transit service within the Bellevue Nickel Improvement Project study area. Four Metro bus routes: 167, 243, 280, and 952, travel on I-405 and serve the Wilburton Park and Ride via bus stops on the I-405 ramps at SE 8th Street. The Wilburton Park and Ride is adjacent to the I-405 southbound off-ramp to SE 8th Street. Metro routes 342 and 885 serve the Wilburton Park and Ride via local streets. Sound Transit routes 564 and 565 travel on I-405 through the study area. Exhibit 9 details the existing transit service in the study area.

Exhibit 9. Existing Transit Service in the Study Area

Route	Service Area	Service Type
167	University District, Bellevue Transit Center, Wilburton P&R, Newport Hills P&R, Kennydale, Renton Boeing, South Renton P&R, Kent Transit Center, Auburn P&R	Weekdays
243	Lake City Way, University District, Bellevue Transit Center, Wilburton P&R	Weekdays
280	Night Owl Service, S Renton P&R, Tukwila, Downtown Seattle, Bellevue Transit Center, Wilburton P&R, Kennydale, Renton	Nightly
342	Shoreline P&R, Aurora Village Transit Center, Lake Forest Park, Kenmore, Bothell P&R, Bellevue Transit Center, Wilburton P&R, South Bellevue P&R, Newport Hills, Kennydale, Renton Boeing, Renton Transit Center	Weekdays
ST 564	Auburn Transit Center, Auburn Commuter Rail Station, Kent Transit Center, Renton Transit Center, Boeing Renton, Bellevue Transit Center	Weekdays
ST 565	Federal Way Transit Center, Auburn Transit Center, Auburn Commuter Rail Station, Kent Transit Center, Renton Transit Center, Boeing Renton, Bellevue Transit Center	Weekdays
885	Coal Creek Parkway, Wilburton P&R, Bellevue Transit Center, Bellevue High School	Weekdays
952	Auburn P&R, Kent P&R, Renton Boeing, Kennydale, Wilburton P&R, Brickyard, Everett Boeing	Weekdays

Source: King County Metro webpage and Sound Transit

How well do the local streets operate under existing conditions?

We rate local street intersection delay as a level of service (LOS) from A to F, a grading scale familiar to most people from the classroom. LOS A is the best operating condition with minimal delays. LOS F is the worst with very long delays and heavy congestion. Exhibit 10 shows the LOS ranking for signalized intersections. We evaluated local street operations using Corsim, microsimulation software. The Corsim model calculates the average delay experienced by vehicles that travel through an intersection.

Exhibit 10. Level of Service Criteria for Signalized Intersections

Level of Service	Average Delay per Vehicle (seconds)	Description
A	0-10	Little or no delay
B	10-20	Short delays
C	20-35	Moderate delays
D	35-55	Long delays
E	55-80	Very long delays
F	>80	Failure - extreme congestion

Source: Highway Capacity Manual, 2000.

We used peak-hour traffic volumes for the morning and afternoon periods to measure delay and LOS in the study area. We evaluated six signalized intersections at or near the I-405 interchange at SE 8th Street for our analysis.

- SE 8th Street and 114th Avenue SE
- SE 8th Street and 118th Avenue SE
- I-405 Southbound Ramps at SE 8th Street
- I-405 Northbound Ramps at SE 8th Street
- I-405 Northbound Off-Ramp at Lake Hills Connector
- SE 8th Street and 121st Avenue SE

WSDOT and the City of Bellevue recently completed work to improve intersection operations in this area. The intersections along SE 8th Street operate well during the A.M. and P.M. peak travel hours. In the 2002 A.M. and P.M. peak hours, all six of the intersections perform at LOS C or better. Exhibit 11 shows the 2002 A.M. and P.M. peak hour intersection LOS.

Exhibit 11. 2002 Existing A.M. and P.M. Peak Hour Intersection Level of Service